The Science of Sleep: Science Buzz Session

PNAS: I’m Sandeep Ravindran, and welcome to Science Sessions. When you need it most, nothing is more elusive than sleep. It controls everything from appetite to health to our daily rhythms. This week we’re featuring a podcast recording from “The Science of Sleep”--a lively discussion with sleep medicine experts Erin Hanlon and Jeanne Duffy held in Washington, DC on March 14, 2012. The event was part of our regular Science Buzz series, and was hosted by PNAS and the Koshland Science Museum. Erin Hanlon, an assistant professor in the department of endocrinology, metabolism and diabetes at the University of Chicago, starts us off by introducing her research on the effects of sleep on metabolism.

Hanlon: So I went to graduate school at the University of Wisconsin-Madison and during that time I looked at feeding behavior and motivation for food reward in sleep restricted animals, and what I found was that sleep restriction seems to alter reward systems in the brain such that when you are having enough sleep and you feel rested if you were to eat something like a carrot, you would elicit x amount of reward value, but to elicit that same amount of reward value following a state of sleep restriction you have to eat something with a higher reward value, so you would need to eat something like a Snickers. If you sleep-restrict a normal, healthy, lean person to four-and-a-half hours a night for four nights, you can elicit the metabolic profile of somebody who looks like they are pre-diabetic or somebody with type 2 diabetes.

PNAS: Jeanne Duffy, an associate professor in the division of sleep medicine at Harvard Medical School, tells us about her work on the body’s daily cycle of activity, known as the circadian rhythm.

Duffy: The focus of my research has been on understanding individual differences in sleep, and one way to get at that is to study the biological clock or the circadian timing system, which is the physiologic system that regulates many aspects of our bodies on a near 24-hour basis--there’s a range from a little bit shorter than 24 hours to a little bit longer than 24 hrs. So we measured it in these intensive laboratory studies that we do, and we found that on average the clock is about 24.2 hours, but that women on average have clocks that were about 6 minutes shorter than men, and many more women have clocks that were shorter than 24 hours than the percentage of men.

Audience member: I have a sleep deprivation question. My daughter gave birth to twins, and sometimes she’s getting about an hour-and-a-half worth of sleep at a time. My question is, what should she watch out for?

Duffy: 24 hours of sleep deprivation is the equivalent of legally drunk in terms of lab-controlled performance tests.

Audience member: So do you have any helpful hints for the new mom?
**Duffy:** Yes, sleep when she can. So if she can take naps during the day, maybe when the babies are napping to try to do that. But definitely driving a car is a bad idea when you’re really sleep-deprived like that.

**Hanlon:** One of the hallmarks of sleep restriction is you think you’re fine, because you also get habituated to it. So you think “Oh, I’m fine, I can do this, it’s not so bad,” but you’re actually more cognitively impaired than you believe you are.

**Audience member:** Let’s say that someone wanted to change their circadian cycle from 8 hours to 7 hours. If you can do this, how long does this take and is it healthy?

**Duffy:** Are you saying you want to reduce how much sleep you get every night?

**Audience member:** Yes

**Duffy:** We actually don’t know very much about how much sleep individuals need or even how to measure that very well. So first of all, can you change your body to need less sleep? We don’t have any idea if you can actually do that or not. And whether it’s a good idea for you to do that is a whole separate question, because there are consequences of not getting enough sleep. Like being sleepy during the day, like altering your metabolism, like altering your immune function, like altering your ability to consolidate memories at night.

**Audience member:** Could each of you talk a little bit about what the purpose of sleep is?

**Hanlon:** While you’re awake your brain is changing and basically growing. So the more you learn, the more changes you may have.

**Duffy:** So the idea is that when we’re awake we’re constantly taking in all this sensory information that our brain is trying to process in these ways, but then going to sleep kind of turns off that sensory information coming in to allow these other processes to take place.

**Audience member:** Are there certain processes you recommend for going to sleep?

**Duffy:** Certainly dim lights in the evening are better in terms of your biological clock, in sort of not pushing it later. And light in the evening may be keeping you more alert and preventing you from falling asleep. And in terms of temperature the recommendation is whatever makes you comfortable. The same thing with the type of pillow or the type of surface that you’re sleeping on, it’s whatever is comfortable for you.

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